

11. A video camera according to claim 9, wherein said exposure amount adjustment means adjusts at least one of the light transmission factor and the light transmission amount of said physical element in accordance with incident light.

12. A video camera according to claim 9, wherein said exposure amount adjustment means comprises storage means for storing at least one relationship between at least one of the light transmission factor and the light transmission amount of said physical element and at least one of the light accumulation time and the sensitivity of said photoelectric conversion means.

REMARKS

The claims now pending in the application are Claims 1 to 12, the independent claims being Claims 1 and 9. Claims 1 and 9 have been amended to define still more clearly what Applicant regards as his invention, in terms which distinguish over the art of record.

In the Official Action dated July 30, 2002, Claims 1 to 12 were rejected under 35 U.S.C. § 102(b), as anticipated by U.S. Patent No. 5,047,847 (Toda et al. '847). Reconsideration and withdrawal of the rejection respectfully are requested in view of the above amendments and the following remarks.

The rejections of the claims over the cited art respectfully are traversed. Nevertheless, without conceding the propriety of the rejections, Claims 1 and 9 have been amended herein more clearly to recite various novel features of the present invention,

with particular attention to the Examiner's comments. Support for the proposed amendments may be found in the original application. No new matter has been added.

Independent Claim 1 as amended by this amendment is directed to a camera having a physical element that can change a light transmission factor throughout the physical element. A photoelectric conversion unit receives an optical image transmitted through the physical element at a position of an imaging plane and converts the optical image into an electrical image signal. A memory unit stores correction information to correct a change in an optical characteristic of the physical element with respect to a change of the light transmission factor throughout the physical element. A control unit corrects the electrical image signal output from the photoelectric conversion unit using the correcting information read out from the memory unit corresponding to the light transmission factor throughout the physical unit to correct the change in the optical characteristic of the physical element and controls drive of the physical element according to the corrected electrical image signal.

Independent Claim 9 as amended by this amendment is directed to a camera having a physical element that can change a light transmission factor throughout the physical element. A photoelectric conversion unit receives an optical image transmitted through the physical element at a position of an imaging plane to convert the optical image into an electrical image signal and is capable of adjusting at least one of light accumulation time and sensitivity. A memory unit stores correcting information to correct a change in an optical characteristic of the physical element with respect to a change of the light transmission factor throughout the physical element. A correcting unit corrects the electrical image signal output from the photoelectric conversion unit using

the correction information read out from the memory unit corresponding to the light transmission factor throughout the physical element to correct the change in the optical characteristic of the physical element. An exposure amount adjustment unit controls the exposure amount by a combination of adjusting at least one of the light transmission factor and the light transmission amount according to the electrical image signal corrected by the correcting unit and adjusts at least one of the light accumulation time and the sensitivity of the photoelectric conversion unit.

In Applicant's view, Toda '847 discloses an endoscope using liquid crystal devices different in response frequency in an image forming optical system. At least a part of an image forming optical system is formed of a liquid crystal assembly consisting of a plurality of liquid crystals having a refractive index anisotropy and having different response frequencies of molecule orientation so that the transmittivity and refractive index of the plurality of liquid crystals may be independently controlled with few signal lines by varying the frequency of the driving signal applied to the liquid crystal assembly.

According to the invention of Claims 1 and 9 as amended by this amendment, a physical element is controlled such that an electrical image output from a photoelectric conversion unit receiving an image from the physical element is corrected using correction information read from a memory to correct a change in an optical characteristic of the physical element and drive of the physical element is controlled according to the thus corrected electrical image signal.

It is a feature of Claims 1 and 9 as amended by this amendment that an image signal output from an image pickup element is corrected using correction information stored in a correction memory and another feature that drive of the physical

element is controlled according to the corrected image signal. Toda et al. '847 may teach performing a correction process by an integrating circuit 434 or by a multiplier 441. As shown in Fig. 45 of Toda et al. '847, the outputs of integrating circuits 434R, 434G and 434B are used to drive a physical element 412. These integrating circuits of Toda et al. '847, however, do not in any manner refer to information stored in a color correction memory 440 to perform a process on an electrical image signal as in the present invention.

The multiplier 441 of Toda et al. '847 may process an electrical image signal using correction information stored in the color correction memory 440. The corrected electrical image signal output by color encoder 448, however, is not fed back to the drive control of the physical element but is sent to be color displayed on a color monitor. In contrast to Toda et al. '847, it is a feature of the present invention as shown in Fig. 5 that the corrected electrical image signal is fed back via drive control circuit 42 for drive control of the physical element 9.

Accordingly, it is not seen that Toda et al. '847 in any manner teaches or suggests the features of Claim 1 of controlling (i) to correct an electrical image signal output from photoelectric conversion means using correction information read out from a memory corresponding to the light transmission factor throughout a physical element, providing an optical image to the photoelectric conversion means, to correct the change in optical characteristic of the physical element and (ii) to drive of the physical element according to the corrected electrical image signal.

It is further not seen that Toda et al. '847 teaches or suggests the feature of Claim 9 of correction means correcting an image signal output from a photoelectric

conversion means using correction information read out from a memory means corresponding to the light transmission factor throughout a physical element that provides an image to the photoelectric converting means to correct the change in optical characteristic of the physical element combined with the feature of controlling exposure amount by adjusting at least one of a light transmission factor and the light transmission amount of the physical element according to the corrected electrical image signal and adjusting at least one of light accumulation time and sensitivity of the photoelectric conversion means. As a result, it is believed that Claims 1 and 9 as amended by this amendment are completely distinguished from Toda et al. '847 and are allowable.

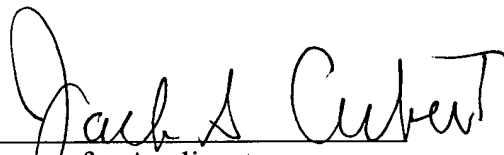
A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's attorney, C. Phillip Wrist, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in black ink, reading "Jack S. Cubert". The signature is written in a cursive style with a large, looping initial "J".

Attorney for Applicant
Jack S. Cubert
Registration No. 24,245

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO THE CLAIMS

1. (Three Times Amended) A camera comprising:

a physical element, arranged in a photographing optical system, that can change light transmission factor throughout said physical element;

photoelectric conversion means for receiving an optical image transmitted through said physical element at a position of an imaging plane, and for converting the optical image into an electrical image signal;

memory means for storing correcting information for correcting a change in an optical characteristic of said physical element with respect to a change of the light transmission factor throughout said physical element; and

control means for (i) correcting [performing processing of] the electrical image signal output from said photoelectric conversion means using [in accordance with] the correcting information read out from said memory means corresponding to the light transmission factor throughout said physical element, to correct the change in the optical characteristic of the physical element, and (ii) controlling drive of said physical element according to the corrected [processed] electrical image signal.

9. (Twice Amended) A camera comprising:

a physical element that can change a light transmission factor throughout said physical element;

photoelectric conversion means for receiving an optical image transmitted through said physical element at a position of an imaging plane, for converting the optical image into an electrical image signal, and capable of adjusting at least one of a light accumulation time and a sensitivity;

memory means for storing correcting information for correcting a change in an optical characteristic of said physical element with respect to a change of the light transmission factor throughout said physical element;

correcting means for correcting [performing processing of] the electrical image signal output from said photoelectric conversion means using [in accordance with] the correcting information read out from said memory means corresponding to the light transmission factor throughout said physical element, to correct the change in the optical characteristic of the physical element; and

exposure amount adjustment means for controlling an exposure amount by a combination of adjusting at least one of the light transmission factor and the light transmission amount of said physical element according to the electrical image signal corrected [processed] by said correcting means, and adjusting at least one of the light accumulation time and the sensitivity of said photoelectric conversion means.